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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,064	11/19/1998	HARM J. W. BELT	PHN16.638	8724

7590

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EXAMINER

LAO, LUN S

ART UNIT

PAPER NUMBER

2643

DATE MAILED: 03/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/196,064

Applicant(s)

BELT ET AL.

Examiner

Lun-See Lao

Art Unit

2643

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Introduction

1. Claims 1-20 of U.S. Application 09,196,064 filed on 11/19/98 is presented for examination.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4 and 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Kellermann (US PAT 5,602,962).

Regarding claim 1, Kellermann teaches that audio processing arrangement comprising a plurality of audio sources generating (see fig.1) input audio, signals, processing means for deriving processed audio signals from the input audio signals, the audio processing arrangement comprising combining means for deriving a combined audio signal from the processed audio signals (see col.4 line 55- col.5 line 2), characterized in that the audio processing arrangement comprises control means for controlling the processing means in order to maximize a power measure of the combined audio signal (see col.3 line 45-col.4 line 55), which means signal-to-noise ratio (SNR) of the sum signal x at the out put of the adder device 5 is maximized and in that the control means are arranged for limiting a combined power gain measure (see col.2 lines 1-12) of the processed audio signals to a predetermined value, which means

the noise component of the sum signal x at the out put of adaptive filter device 6 is to a threshold or predetermined level $SNR = (\sigma_s)^2 / (\sigma_n)^2$, $0 < (\sigma_n)^2 \leq 1$.

As to claim 10, there is a method claim of claims 1 respectively. Thus note claim 1 respectively, for rejection.

Regarding claim 2, Kellermann discloses that audio processing arrangement includes characterized in that the processing means comprise scaling means for scaling the input audio signals with a scaling factor for obtaining the processed audio signal (see col.3 lines 45-61), said control means comprise further scaling means for deriving a plurality of scaled combined audio signals with a scaling factor corresponding to the scaling factor of the scaling means (see fig 1), and in that the control means are arranged for maximizing a power measure of the combined audio signal (see col.3 line 35- col.4 line 55), and for limiting a combined power gain measure of the processed audio signals (see col.2 lines 1-12) by minimizing a difference between the input audio signals (s) and the scaled combined audio signals(x) corresponding to said audio signals $x = s + \text{noise}(n)$. Evaluation unit eliminates the noise signals, therefore the scaled combined audio signals (x) are approximately equal to the input audio signal(s), which minimized the difference between the combined audio signals (x) and input audio signals(s).

Regarding claim 3, Kellermann teaches that the audio processing arrangement includes characterized in that the processing means comprise a plurality of adjustable filters (see fig.1, #3, #5, #6) for deriving the processed audio signal, in that the control means comprise a plurality of further adjustable filters having a transfer function being

the conjugate of the transfer function of the adjustable filters (see fig.1, #3, # 5, #6 and col.4 line 55-col.5 line 2), said further adjustable filters being arranged for deriving from the combined audio signal filtered combined audio signals, and in that the control means are arranged for maximizing the power measure of the combined audio signal (see col.3 line 45-col.4 line 55), and for restricting a combined power gain measure of the processed audio signals to a predetermined value by controlling the transfer functions of the adjustable filters and the further adjustable filters in order to minimize a difference

measure between the input audio signals and the filtered combined audio signal corresponding to say input audio signals (see fig.2 and col.4 line 53-col.5 line).

Regarding claim 4, Kellermann discloses that the audio processing arrangement comprises delay elements (see fig.1, #2) for compensating a delay difference of a common audio signal present in the input audio signals.

Regarding claim 8, Kellermann teaches that audio signal processing arrangement comprising a plurality of inputs for receiving input audio signals (see fi.1), processing means for deriving processed audio signals from the input audio signals, the audio processing arrangement comprising combining means for deriving a combined audio signal from the processed audio signals (see col.4 line 55-col.5 line 2), characterized in that the audio processing arrangement comprises control means for controlling the processing means in order to maximize a power measure of the combined audio signal (see col.3 line 45-col.4 line 55), which means signal-to-noise ratio (SNR) of the sum signal x on the out put of the adder device 5 is maximized a power and in that the

control means are arranged for limiting a combined power gain measure (see col.2 lines 1-12) of the processed audio signals to a predetermined value, which means the noise component of the sum signal x at the out put of adaptive filter device 6 is to a threshold or predetermined level $SNR = (\sigma_s)^2 / (\sigma_n)^2$, $0 < (\sigma_n)^2 \leq 1$.

Regarding claim 9, Kellermann discloses that the audio signal processing arrangement characterized in that the processing means comprise scaling means for scaling the input audio signals with a scaling factor for obtaining the processed audio signals (see col.3 lines 45-61), said control means comprise further scaling means for deriving a plurality of scaled combined audio signals with a scaling factor corresponding to the scaling factor of the scaling means (see fig.1), and in that the control means are arranged for maximizing a power measure of the combined audio signal (see col.3 line 45- col.4 line 55), and for limiting a combined power gain measure of the processed audio signals (see col.2 lines 1-12) by minimizing a difference between the input audio signals (s) and the scaled combined audio signals(x) corresponding to said audio signals $x = s + \text{noise}(n)$. The noise signals are eliminated by evaluation unite, therefore The scaled combined audio signals (x) are approximately equal to the input audio signal(s), which minimized the difference between the combined audio signals (x) and input audio signals(s).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kellermann (US PAT 6,602,962) in view of Kaneda (US PAT 4,536,887).

Regarding claim 4, Kellermann discloses that audio processing arrangement includes that the audio sources comprise a plurality of microphones (see fig.1), however kellermann fails to teach that microphones are placed in a position such that their directionality patterns are substantially disjunct.

Kaneda further teaches that audio processing arrangement includes that the audio sources comprise a plurality of microphones, and in that microphones are placed in a position such that their directionality patterns are substantially disjunct (see fig .21e and col.20 line 10-col.21 line 20).

Therefore, it would obvious to one of ordinary skill in the art at the time invention was made to modify Kellermann 's to provide microphone-array apparatus which can be constructed on a small scale and permits adaptive selection of the desired signal for varied positions of a desired signal and noise sources.

Regarding claims 6-7, Kaneda discloses that audio processing arrangement includes that the microphones are placed around a center position at angles being equal to 360 degrees divided by the number of microphones (see fig.21d and col.20 line 10-col.21 line 20) and the audio sources comprise a plurality of microphones being placed in a linear array (see fig.21a and col.20 line 10-col.21 line 20).

Conclusion

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6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Crow (US PAT 5,657,393) is recited to show how other related the audio processing arrangement with multiple sources.

7. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

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or faxed to: (703) 872-9314

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lao,Lun-See whose telephone number is (703) 305-2259. The examiner can normally be reached on Monday-Friday from 8:00 to 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz, can be reached on (703) 305-4708.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 whose telephone number is (703) 306-0377.

Lao,Lun-See
Patent Examiner
US Patent and Trademark Office
Crystal Park 2
(703305-2259)


DUC NGUYEN
PRIMARY EXAMINER